THE AIR LINE PILOT

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ORIENTATION AGAIN TOPIC BY HAL SNEAD

Gives Explanation of Methods and Use on Specific Beacons

USES PITTSBURGH AS EXAMPLE

Explains Two Systems for Comparison on One Beacon

By HAL SNEAD

Since the publication of my article on orientation in the last issue of the "Air Line Pilot" it struck me that it might appear as though A. L. P. A. is sponsoring or recommending an arbitrary method. There are other systems being used, of course, and at least one of them is equally as effective and preferable to the 90° system on beacons having pronounced acute angles such as Buffalo, Pittsburgh, Goshen, St. Louis, Tulsa, Salt Lake, Oakland, and a few others.

Before going on with the other method, however, and without intending to appear critical, don't you think the orientation system shown in the S. A. T. R. Problems booklet could be simplified by making it a rule to turn right upon striking a beam regardless of the quadrant in which your problem started? Surely this rule is retained more easily in our memory and the system still has the same infallibility. And, in like manner, all turns to place the ship in position to turn down the beam are to the left after the 90° turn. **Right** and **left** is always the order. "Right" after striking a beam for purposes of orientation and left—away from the beacon — to place the ship in a position to turn down the beam. In so doing we eliminate the possibility of turning into or across the station—if we are working in close—and have a much better chance of getting on the beam where it is wider and trimming our ship for the accurate work necessary to take us over the cone of silence.

Now for the system referred to above: You have undoubtedly given such beacons as those named above, considerable thought in connection with the so-called 90° method of orientation. Pittsburgh for instance with its broad North and South quadrants, offers quite a problem to the 90° method. To fly either East or West in either one of these quadrants, especially at considerable distance from the station, would mean a long drawn out process in striking either beam. The parallel system offers no such obstacles You are familiar, of course, with this station, so we will use it for purposes of explaining the system in mind. I am enclosing a sketch of the beam arrangement of this beacon showing a few problems which are referred to during this description.

Unlike the "90°" method, our prime consideration in this system is not to fly in the direction of and intersect a beam. We depend, rather, upon increased or diminished signal strength in determining whether we are approaching or leaving a station.

Draw in the bisecting lines of the two "A's" and the two "N's". Now, if we are in the "N" quadrant it is permissable to fly either North or South; that is, parallel with the bisecting line of these quadrants. As soon as the ship is on either of these two courses

(Continued on Page 3, Col. 1.)

MORE THAN 160,000 PHYSICAL TESTS BY D. OF C. MEDICOS

Extensive Work of Examiners Proves Aviation Increase

Medical examiners of the Aeronautics Branch had conducted 164 967 physical examinations of applicants for student permits and licensed pilots at the beginning of September of this year. A check of the records showed that the number examined each year since this work was undertaken was as follows: 1927, 4,325; 1928, 20,172; 1929, 38,982; 1930, 38,301; 1931, 38,774; 1932 (through month of August), 24,413.

The greatest number of reports from medical examiners submitted in any one year was 38,982 in 1929, although 1931 was a close second with 38,774. The month of August generally has been a leading one with respect to number of medical examinations conducted. In August, 1929, the examinations submitted numbered 5,557; in August, 1930, 4,408; in August, 1931, 4,061; and in August, 1932, 3,784.

The number of designated medical examiners now is 816. These physicians are located at 471 places, including a few outside of the 48 states. Among the latter are one unit in the Canal Zone, one in Central America, one in Cuba, one in Haiti, seven in South America, one in Mexico City, six in Alaska, one in the Territory of Hawaii and one in the Phillippine Islands.

These medical examiners are practicing physicians e s p e cially qualified in aviation medicine who have been designated to conduct examinations of student and licens- pilots by the Aeronautics Branch They do not receive salaries from the Federal Government but conduct the examinations upon a fee basis, the fees being paid by the applicants for student permits or licenses, or renewals of licenses.

B. A. T. West Commends on S.A.T.R. Help

Boost Use of "Air Line Pilot" For Educational Purposes

By ROBERT M. COCHRANE
Special Correspondent

Frank Yager is slowly recovering from an appendicitis operation. His condition is favorable and we hope to see him again soon on his regular run between Cheyenne and Omaha.

John Murray has just returned from a week's vacation up at Steve Kaufman's summer lodge in Northern Minnesota. John failed to take pictures of the big fish he caught, but we will vouch for the good time he had with Steve.

It is very fitting to commend President Behncke for the thoughtfulness and work of having Headquarters prepare the "Brief" relative to the Schedule Air Transport Rating. We acknowledge our indebtedness and we appreciate this bulletin.

The association paper "The Air Line Pilot" contains some very interesting articles about all points of our work and activities and all Pilots should read all of them. It is hoped that the news correspondent's Articles will add a personal touch to the paper.

Solar Eclipse Flight Told by T&WA Copilot

Special Trip Into Clouds for Observation

By W. CAMPBELL

Have you ever wondered what was above an over-cast? Twelve passengers aboard a Transcontinental & Western air plane flew above one and discovered an eclipse of the sun there on the afternoon of August 31st. Yes, it was the expected and primary reason for the flight. However, what was to be found in those elevations above that ceiling of five hundred feet might have been more interesting to some.

Departing from Kansas City Airport at 1:35 with a 1,000′ ceiling, we flew to St. Joseph, Mo. The ceiling dropped to 500′ a short distance from Kansas City, Mo. At St. Joseph, the lower cloud formation terminated, giving us a ceiling at this point of about 2000 feet Here we could see that this lower layer was about a thousand feet thick, and seemed to radiate great beams, with its hub in the vicinity of Kansas City. At intervals on these cloud beams, thunder heads were built up, extending into the second and higher layer. We pulled up into the second layer and after climbing through a series of layers, we came out on top of the thickest layer 8000′. There was still a thinner layer higher up with the sun shining through a few miles to the south of us. At the time we reached this point, where the sun was just visible through the higher thin layer, estimated to be 20,000′, we were flying at 16,500′. Here the eclipse could be seen quite clearly through the thin layer of clouds. We descended over Atchison, Kansas, and returned under the 500′ ceiling to Kansas City.

The twelve passengers were: H. H. McElroy, City Manager; A. M. Hamrick, Local Weather Man; L. E. Holland; W. H. Holland; G. E. Everett; Chas. A. Grumich; G. E. Camthen; A. E. Lyons; Gilbert Smith; Earl Hense; H. F. McCoy; Sol Stadna; Larry G. Fritz, Divisional Superintendent of T & W A, Pilot; and W. Campbell, Co-pilot.

Pilots Seniority Discussed By Council No. 3

We wish to offer for the pilots' consideration a few principles for the support of an established Seniority List consdieration

A pilot's seniority shall be determined by the last date on which he began continuous and uninterrupted employment as First Pilot or Reserve Pilot with T. & W. A. or one of its component companies; Western Air Express, Maddux Airlines and T. A. T. A pilot demoted to co-pilot because of reasons which were no fault of his own, shall have his seniority continue to date from the date on which he was first placed on the status of First Pilot or Reserve Pilot.

A pilot, who through a choice of his own, changes or has changed his status from that of First Pilot, shall have his original seniority date set back by an amount of time equal to that period during which he was not acting as a regular First Pilot.

A pilot absent from duty because of illness or other temporary physical inability shall be entitled to have his seniority continue from his original seniority date.

The senior pilot on a division shall be entitled to choose the run he desires on the division on which he is assigned. He shall be entitled to move to a run on a different division in his own region only when there is a vacancy on that division he desires to move to.

In case of reduction of schedules, or the cancellation of a run, the pilots thus displaced, are entitled, according to their seniority standing, to choose the run and division on which they may desire to be assigned The junior pilot of that division will then be demoted to co-pilot, unless he is senior to some other pilot on a different division. In that case he rates taking the run on the other division. This will result in the junior pilot of the region being finally the one to be demoted.

After a senior pilot has selected the run, night mail or day passenger, that he desires on his division, he shall not be permitted to change again as his fancy may dictate, unless a vacancy may occur to which his seniority entitles him.

FRANCIS W. BRIGGS

During the experiences of the Association we have bowed our heads in sincere recognition of the pioneering done by our members.

Yet this duty is not always a pleasant task; for we must now offer our recognition to a sacrifice which has the toll of a life!

Francis W. Briggs, was a member of the Century Airlines corps of pilots who were the first to support their Association pledge by refusing to work under conditions not in accordance to the right consideration of brother pilots.

And it is to his memory that we offer these annals in the History of the Air Line Pilots Association.

During those trying days when Century Airlines operated with strike-breakers for pilots, Pilot Briggs did more than his bit by cooperating with Headquarters in establishing the truth to the people of the country.

The facilities of the powerful radio station WCFL owned and operated by the Federation of Labor, were turned over to the Association. It was Pilot Briggs' duty to speak to invisible thousands and tell the story of the Century Controversy.

This he did and to a great success.

Following the withdrawal of the Century Airlines from actual operation, Pilot Briggs' work was finished. He then sought employment on the other airlines.

After much correspondence and travel he, together with several brother pilots, were placed on the Southern Division of American Airways as copilots.

His contention throughout for the establishment of a sound Association would be a placing of the progress of the Association above all else; the setting of a precedent for coming years and the abolishment of indvidual pride.

An able First Pilot himself, a flyer of no average ability, he was content to fly as a copilot as the definite expression that no foundation or future can be obtained without the struggle and presentment of a precedent.

And it was as a copilot that he met his death last month in a fatal crash which took the toll of another staunch member, Pilot William J. B. Robbins.

We do not intend to hold any brief here of the accident or its causes. Those have channels of procedure elsewhere.

But we do ask, in solemn appreciation, that the entire membership of the Association forever carry the memory of thie example.

Radio Talks by Pilots Educates Public to Needs

Publicity Informing Public of Pilot Requirements

EDITOR'S NOTE

Public sentiment and attitude are one of the prime factors of interpreting the success of any profession. During the course of the past Summer season many air line pilots have been before radio microphones telling the public some of the romance of flying.

However, if we are able to tell the public of the requirements which are exacted from air line pilots and bring the picture of those requirements in the pilot's home we very successfully are substantiating our contention of professionals.

We are reprinting a radio talk prepared with the assistance of a pilot on the Pacific Coast for broadcast on a local station. It was the second of a series which proved very popular. If, in the event any pilot is called on to prepare or give a radio talk we hope that this will be of assistance.

Headquarters staff is available for assistance to any members of the association who are scheduled to give a talk or write a story.

* * *

Today's aviation talk is going to be about air transport pilots — about those fellows who, day and night, season in and season out, are delivering passengers, mail and express in all parts of the country and who, with their work, have helped put air transport in the place which is holds today.

People are constantly asking us what our pilots are like, how they regard their work, and what they do in their off-time hours. The answer to all those questions is that they are like any other business men going about their daily jobs. They are an energetic, conscientious lot, and flying perfection is their ultimate aim.

People once regarded flyers as more or less of an adventurous, devil-may-care class of men, following romantic and spectacular careers. That, however, was before air transport settled down to the steady systematic business which it has become today. It is true that some of the early flyers did follow rather adventurous lives. When air mail operators first were begun these men were called upon to get the mail through to its destination in the fastest possible time and as best they could. Their stories form a colorful chapter in the history of air transport's growth.

With the start of passenger carrying, however, the pilot type changed. Safety First became their watchword and flying dependability became of primary importance. Air transport took on the aspect of an industry and the flyers became a part of the organization which was to give that industry its present standing in the transportation field.

The pilots who fly planes in and out of Seattle are typical of the transport flyers over the country. There are seven of them. Perhaps you have seen them on your visits to the airport — seen them come out of the administration building just before the plane is to leave and seen them take their places in the ships and test out their radio equipment before taking off. Perhaps you have noticed that they go about their work without show and without attracting any undue notice. Modesty, incidentally, is one of their most noticeable character-

(Continued on Page 4, Col. 3.)

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S. A. T. R. EXAMINATION

The Scheduled Air Transport Rating examination as given by the Department of Commerce has not proven in any sense to be the boogy-man of which many have feared.

The phychology of an examination confronting us alone has its fears, in fact we might term it one of the new mental hazards of air line flying. The written examination as the Department presents it, is merely an outline which will enable them to determine that a pilot is thoroughly cognizant of the specifications and interpretations of Bulletin 7-E, and the fundamentals of weather forecasting.

This examination usually comprises ten questions. The prime purpose is determining interpretations as the pilot may see them and the restrictions which are placed on bad weather flying.

It may be well to remember that the Department in no way is extending a privilege to the operators for the operations of a schedule air line through or over the top of fog for any protracted period.

Of the lines which have already been examined, the brief on the S A T R sent to each member of the association has proven to be distinctly the authoritaive text book; by that we may reasonably assume that the written tests which the department will give are completely covered in that brief with exception of weather questions.

The flying test in any instance has not proven severe, while there are several methods of orientation recommended, several of which we have published in this paper it must be borne in mind that there should be no guess work; it is not necessary. The other flight tests required in the rating such as spirals, banks and turns, is merely the establishment of the definite confidence and knowledge of your instruments. They have proven adequate for the purpose of these tests and in the assimilating of the practice hours the main establishment is that of understanding and the confidence in the instruments to the extent that they will bring you successfully into and out of the maneuvers required for your flight test.

One distinctive favorable reaction, from the pilots who have taken this test, is the keen desire to look upon this "business" of flying from the element of learning more.

———o———

COPILOTS

The definite status of copilots in the Association is to be one of the subjects at our first annual convention next week. There have been widely varied opinions on the copilot status. But it must be remembered that such as are his duties, we find them as the only element of restricting this profession to those definitely worthy.

Literally, the term copilot is probably erroneous, as it means a pilot of equal status. In reality the duties and position is that similar of a first mate to the master of a vessel.

And it is through such a recognition as a mate to the pilot that the advancement in our profession may be achieved. It is on the premise that the first pilot is the master of his ship and that the copilot is the mate of that ship that he gains the knowledge and experience of flying requisite to establishing himself as a competent first pilot. This is a procedure and experience which has been undergone by the Maritime licensing laws of international recognition.

"RIDING THE BEAM"

By WAYNE C. WILLIAMS

Nite Mail Pilot—T. W. A.—Col.-K. C.

Directional radio beacon course flying has recently become the main topic of conversation and thought among all transport pilots actively engaged in scheduled line-flying. Many of the regular scheduled passenger and mail flights, all over the country, are converted into practice flights in 'Riding the Beam'.

On January 1, 1933, the new 'Scheduled Air Transport Rating' becomes effective. This is issued by by the Department of Commerce, and all pilots employed on regular air lines will be required to hold this rating as part of their transport license. The department air line inspectors are now conducting examinations and flight tests, qualifying pilots for the rating, as fast as they can get them. Many of the major operating companies have rigged up spare equipment with a hooded cockpit, etc., and instruction is being given to their pilots in instrument flying and radio beacon work.

A major feature of this flight test is the use of the directional radio beam, while under the hood, or 'blind', for finding the airport; and also for solving problems of orientation.

The principal transcontinental air routes have a very complete system of radio ranges, established and maintained by the Department of Commerce, and for several years these have been in constant use. The pilots flying mail and express cargoes only, are alone, and sit on parachutes, and constantly push into and thru all kinds of bad weather. Sometimes flying for several hours without glimpse of the ground over which they are passing; and, in days not so long gone by, navigating to their destination by 'dead-reckoning', and considerable guessing as to their position when finally breaking out of the weather, with the home field still to be found.

Radio Beacons

The directional radio beacons have done away with the guess work of navigators thru adverse weather, and together with two-way radio communication has done much to improve schedule flying performance, and has increased the safety factor immeasurably.

Proficiency in flying a 'Beam' is attained thru constant practice, as it is the case in all other phases of flying. Consistence in 'listening in' on a beacon trip after trip over a run, trains the ear and it readily adapts itself to the steady drone of the signals; and tone changes with subsequent flight corrections, due to variations in signals, becomes almost sub-conscious and greatly relieves the nervous tension occasioned in instrument flying and bad weather combined.

This is especially true if the pilot would train himself to fly in the "Twilight Zone", especially at distances greater than 7 to 10 miles from the range house. The 'On-course' signal is WEDGED in shape and the WEDGE widens, in proportion, as the distance from origin increases, becoming about 8 miles wide approximately 100 miles removed from the range house.

The "Twilight Zone" is that area along the outer edge of the 'On-course' zone, relatively narrow, where the blending of both the 'On-course' and 'Off-course' signals —either 'A' or 'N'—can be heard. It forms a narrower, straighter line to follow, also making it easier and quicker to correct for drift to one side or other, with a minimum change in the compass reading. This because the signal changes are heard more distinctly, and are detected sooner than if the 'On-course' signal only was used, as its zone several miles wide, causes considerable drift before corrections are made.

In 'Blind Flight' it is often desirous to know the approximate position with reference to the ground immediately below, with reasonable assurance of being correct in calculations. As a check to the estimated ground speed, determined from air speed and flying time, the width of the 'On-course' zone is used. By flying at right angles to the course, from one 'Twilight Zone' to the other, across the 'On-course' zone, and checking the time required to do this, it is possible to estimate, from known airspeed, the approximate width of the 'Beam', and hence a proportionate mileage from the range house is obtained.

The "Marker Beacon" only having a radius of around 8 to 10 miles, is the best check possible as to location between any two points. It is generally set at a wave length nearest the course beam a plane would most likely be using in that area, and for a short period would dominate the regular beam, thereby informing the pilot that his location was in the immediate vicinity of the 'Marker'.

Computing

With a radio beam becoming about one mile wider for every 12 miles removed from the range house, assuming an air speed of 120 M. P. H., and a timing of 2 minutes to fly across the beam at right angles, it is readily computed that the beam is 4 miles wide, roughly, and position is approximately 50 miles from the range. This, of course, is a variable, as many beams are known to be narrower than the above basis of calculation; but this is an average. As pilots learn the peculiarities of terrain, land-marks and obstacles, as well as weather; so will they become familiar with the idiosyncrasies of the radio beacons along their routes. This is a major argument for keeping the pilots assigned to the same runs, year after year, instead of shifting them about, where weather and radio conditions are different, and pilots are required to learn new territory and its bad weather features all over again.

Because of the wedge shape of a radio beam, it is always best to tune in on the range at your destination, in preference to using the beam at the point of departure, altho the beam at departure point will be needed until within range of audibility of the destination beam.

Close approach to the beacon at destination is best detected by a fairly rapid increase in the signal strength, necessitating frequent turning down of the volume control, until signals are clear and distinct, but not grating to the ear drums. This reduced volume of sound is also most important in enabling the pilot to identify the signal break, or "Blind-spot", occurring immediately over the beacon station.

Cone of Silence

This 'Blind-spot' is conical in shape, and is vertical in direction, and at 3,000 feet altitude is approximately ¼ mile in width, and is readily recognized when passing over it from 2,000 feet or higher. It is slightly harder to catch at lower altitudes, but with practice can readily be noticed within 500 feet above the range house.

The best method of descent and approach to the airport after passing over the beacon, in order to best pick up the field visually, is open to discussion. Many pilots prefer to drop down to within 500 to 1,000 feet above the field concerned, 'Blind Flight' and low ceilings assumed,—go past the signal break sufficiently far to make a 180 degree turn and come back toward the field, gradually losing altitude and looking for sight of the ground and field, still keeping on the beam or easing off to the side on which the field is known to be located. This is quite adaptable to cabin type planes, where the forward visibility is practically unobstructed, and where the area surrounding the airport is flat and obstacles few.

Perhaps the best accepted means of descent to a field while 'Blind' is to spiral down. The spiral to be wide enough to keep the plane over the range as nearly as possible, and to include all four legs of the beacon to be audible as the descent is made. This method has the distinct advantage of covering a small area, and by using the four 'On-course' signals as a check it is possible to know just exactly what is below on the ground. It also enables the pilot to devote most of his attention to his instruments, requiring only occasional glimpses to one side and down to sight the ground as soon as it becomes visible. The spiral descent also reduces the hazard in coming down to fields badly surrounded by obstructions, such as hills, high tension lines, buildings or tall smoke stacks. Further, as most of the range houses are located quite close to the fields, a spiral descent around the beacon will most likely insure sight of the field proper or something most familiar as soon as the ground surface is picked up visually, which is very important with visibilities of a mile or less.

"Night Effects"

"Night Effect" is the unknown 'bug-a-boo' of the radio range, which at times plays havoc with the 'Beam', causing distortion of signals and often 'swinging' the beam from one side of a course to the other. To attempt to follow a beacon course when it is performing in such a manner is most difficult and extremely annoying, especially when flying 'Blind' and busy with flight instruments, and seemingly hundreds of other items. This 'swinging' of the beam has been known to pass, while in straight flite, from the 'A' signal thru the width of the 'On-course' signal, to the 'N' side and back again to the 'A' zone as often as twice within one minute.

Because of this 'Swinging Beam', most noticeable at nite, it is found to be best to fly a radio beacon course as much by compass reading as is possible, referring periodically to the beam for drift and other corrections. By flying principally with the compass, tho completely 'Blind' it is a simple matter to overcome a crooked line of flight occasioned in attempting to fly a 'Swinging Beam'.

The Department of Commerce expects to correct for this 'Night effect' by installing 125' radio range towers in place of the 75' towers now in general use.

Probably one of the greatest attributes for successfully negotiating adverse weather, with the help of the radio beacon, is the ability to take all the time necessary, and under no circumstances do anything hurriedly. There are too many variables, not within a pilot's control, which can be the source of errors in solving a bad weather flight problem. It takes time and a level head to think out each successive move to correct these errors as they become apparent Hasty moves in 'Blind Flying' will only be the more confusing, and everything will be that much harder to square away. — So, Take Your Time!

"To fly West, my friend, is a flight we all must take for a final check."

In Constant Memoriam

Andert, Paul A.—BAT West

* * *

Bigelow, Ed.—Varney

* * *

Briggs, Francis W.—AA South

* * *

Cox, F.—Ludington

* * *

George, Hal—TWA

* * *

Hill, George W.—T. A. C.

* * *

Kelsey, Harold J.—AA South

* * *

Lucas, V.—Ludington

* * *

Malick, Forrest E.—NAT East

* * *

Potter, Norman W.—BAT West

* * *

Robbins, Wm J. B.—AA South

* * *

Rousch, Chas. W.—Northwest

* * *

Rust, F. H.—TAC

* * *

Sandblom, J. V.—C-P

* * *

Sharpnack, J. W.—BAT West

* * *

Swanson, Axel—AA Universal

MORE ABOUT ORIENTATION

(Continued from Page 1.)

turn the volume down to a point where the signal is clearly but faintly audible. Keep on this course until you have determined if the signal is increasing or decreasing, at which time you know whether you are approaching or leaving the station. The rapidity with which the signal strength will show an appreciable change varies with the distance from the station. We have made exhaustive tests on our Lockheeds between Columbus and Chicago and at a distance of sixty miles the time required ranges from five to seven minutes depending upon static conditions. The other extreme from a position close to the station varies upwards from a minimum of approximately thirty seconds.

Suppose we are at "Y" in the North "N" quadrant when our signal is tuned in. We can fly either North or South, and here we make one of the two guesses we are permitted to make in connection with the solution of our problems. We think we are in the South quadrant so we fly North expecting to pick up a stronger signal but instead it becomes weaker so we know we have guessed wrong. We cannot fly North in a South quadrant and pick up a signal of less intensity with the same volume setting. We are now orientated with respect to the quadrant in which we are flying but we still do not know our exact position in that quadrant. We can either fly South-east and pick up the North-east beam as shown by X-1 on the drawing or South-west to the North-west beam as represented by X-2. Now here we make our second guess. We **think** we are Northeast of the beacon at "W" and will lose less time in solving our problem by flying South to the Northeast beam. We have guessed wrong again, however. We are at "X" and to eliminate any evil conseqences from a bad guess we make our system infallible by flying a Southeast course of 115° or parallel with the South-east beam instead of South from our guessed position at "W". It is even preferable to fly a trifle North of this course—110°—to eliminate the possibility of flying in too close to the beacon or drifting across the North-west beam.

You can see what would happen had you flown, say—due South from "X". We "guessed" we were northeast of the station and the obvious thing, of course, would have been to fly South to save time and pick up the northeast beam. Your guess was not correct, however, and had you flown South, the northwest beam would have been encountered and you would have done your level best to ride that beam southwest at a course of 245°. Eventually, you would have found your mistake but not until much valuable time had been lost. This is a case where the "longest way round is the shortest way home". Have a system and stay with it. Understand that system completely. Burn a little midnight oil and draw chart after chart of various beacons and place yourself in every conceivable position in respect to them, and work out an **infallible** method of flying into those stations.

In the "parallel" system suggested here, like the 90° method there is a positive and infallible solution to every problem and although you are permitted two guesses as compared to none in the 90° method, the final solution is never a doubtful one. If the guesses are correct some time is saved—if the guesses are wrong, the problem is solved just as accurately but with a little more delay.

If you will consult the diagram you will see that a problem in any quadrant is solved with the same ease and dispatch as the North "N" explained in this description. For example—Suppose we are at "T" in the West "A" quadrant. We guess incorrectly as usual and fly west to pick up a stronger signal. Instead, it becomes weaker and we know positively that we are in the west segment. This decision is reached at "W" at which time we can elect to intersect the northwest beam at "3" or the southwest at "4". Suppose we choose the northwest thinking we are nearer to that beam. Fly northeast on a course parallel with the northeast beam or 65° (preferably 55° or 60° as explained above). The rest is simple.

In diagram No. 2, we have a combination of the 90° system and the parallel system. The beams forming the A quadrants are very close together, so our problem would be solved a trifle faster by adapting the 90° method. It is permissible to fly either north or south and upon striking a beam, the usual 90° right turn is made and the letter received immediately after gives us our position and we turn to the left—away from the station—to put ourselves squarely on the beam. At this station (Pittsburgh) the rule would be to fly North in any quadrant In the N quadrant our position is determined by signal strength; in the A, upon turning 90° after intersecting a beam. Both systems or a combination of the two are equally effective. But the pilot must choose the one appealing to him—learn it well and **stick to it.** As we have reiterated time and time again, he must draw up his own diagram for every beacon on his course. The topography is never the same at any two stations and it may be that safety will demand that one of the four beams be left out of the problem. His familiarity with

Diagram No. 2

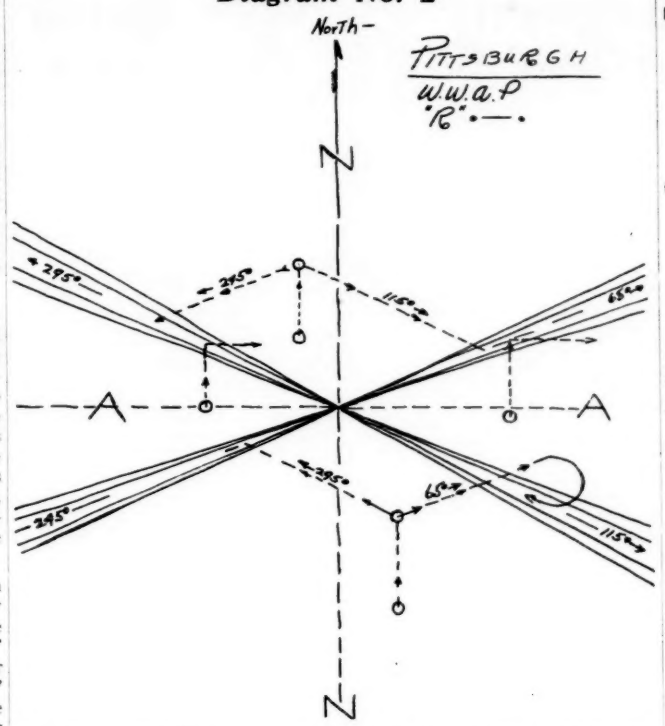
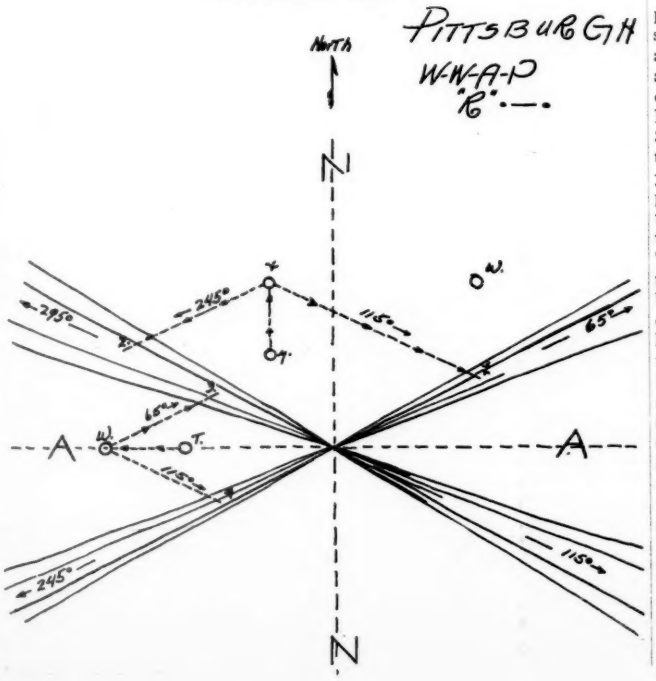


Diagram No. 1



the surrounding terrain will decide that. For instance, at Kansas City, our southeast beam runs directly over the main section of town. Inasmuch as some of our problems require low flying we have eliminated that beam from the 90° system employed. At Albuquerque the East beam runs directly over mountains that require about 10,000 ft. to clear safely, while the other three beams are comparatively safe at 6,000 to 7,000 ft. Obviously we have eliminated this beam from our system.

I will run the chance of constant repetition by again declaring that this must require **study.** There is nothing intricate about it but we must have a clear mental picture of the beam arrangement on every beacon. Know the system we are going to follow and **carry it through to completion.** The systems are absolutely infallible. If you do your part they will take you home every time, without fail.

Now about over controlling on the beam. The best advice I can think of is to **Know your beam courses** and **watch your compass.**

After you have once contacted your beam and are receiving the on course T signal with the compass reading the approximate beam heading, never fly at an angle in excess of 30° to that course in an attempt to quickly return to the beam in case you drift off or leave it because of an error in your original compass course. You will know the error of your compass within a few degrees. If the error is great, you have no business trusting your life to it. And that is exactly what you are doing in thick weather and especially in a mountainous country.

This 30° rule applies only to a point at some distance from the station. In completing one of your always a slight error in your turns and timing and a little time is required to place you on the beam. In making these corrections the 30° rule applies. After once getting squarely on the beam, keep your ship trim and watch that compass for your average course. From that point on do not turn more than 15° in making a correction. The closer you get to the beacon, the smaller the correction. As the beam becomes narrow make your corrections small. Don't be in a hurry to get back on the beam upon hearing an off course signal. If you have ridden the beam squarely for any distance and hear an off course signal coming in, you can't possibly be far from a parallel course with your beam. Make a small correction (half the width of your turn hand, or less, 2 or 3 seconds) and hold that course and listen to the strength of your off course signal and twilight zone. Hold your ship level and check with your compass at the same time. In extremely rough weather you might be thrown off considerably and be compelled to make an additional correction. Ordinarily, however, the slight correction mentioned above will suffice to put you back on the beam. And don't forget to turn down the beam when it is again encountered. This turn should be approximately one half of the accumulated corrections **into** the beam. Don't wait until you cross the beam and pick up the opposite letter. Make a very slight turn when you hear the on course coming back strong and the remainder when the off course is completely gone and you are again on the beam.

When within a short distance of the beacon—when the beam is becoming very narrow and the signal strength building up rapidly—forget the compass and devote all your time to the bank and turn (especially the turn hand) and the minutes corrections necessary to stay squarely on the beam. And when I say **"minute"** I mean just that. As long as you are receiving a part of the twilight zone with the off course signal—if you are off the beam—you will hit enough of the silent zone to detect it beyond a doubt. If you are doubtful — and this rule always applies — continue on with the turn hand squarely in the center, with volume turned down low and you will receive a built up metallic sound immediately over the beacon. This is unmistakable and occurs at no other point on the beam system except a small circle around the station. This differs, of course, with altitude and cannot be stated definitely. At 3,000 ft., however, the silent zone is approximately 6 seconds wide and the metallic sound about a half mile in diameter. This is in a Stearman cruising at 90 M. P. H.

To sum up:

After getting the ship on the beam course—in the twilight zone, of course, and fairly close to the beam—don't turn more than 30° from that course to pick up the beam. Decrease this turn with every correction until you are squarely on the beam. Watch your compass closely in these early stages and from this point on make your maximum correction 15°. Upon approaching the beacon make the corrections smaller and smaller until the compass is forgotten entirely and you fly entirely with bank and turn and off course signals. Watch your bank and turn closely — learn to fly your ship smoothly and you will have little trouble finding the blind spot. Always fly through the silent zone and over the heavy metallic sound before cutting your gun. I say "always" because we occasionally encounter a fade-out on the beam some distance from the beacon which is identical with the silent zone. When your signal returns, however, its volume will only equal that received immediately preceding the fadeout and the return will be a gradual one. The heavy built up metallic signal of the beacon, however, increases so rapidly that it is usually necessary to turn down the volume to save one's ears and this rapid change distinguishes it from the fade out just mentioned. Another reason for flying through the silent zone is to put the ship squarely over the beacon before attempting a spiral. The beacon will be in the center of the circle and with a little practice any pilot can keep himself perfectly orientated in respect to the quadrant he is in at any time, staying in the same degree of bank and making small corrections for drift if the wind is of sufficient velocity to warrant.

If you miss your beacon—if you are not absolutely sure that you have passed over it—go out on the continuation of your beam far enough (3½ to 4 minutes is sufficient distance) to make your turn and place the ship squarely on the beam before it gets too narrow. Try it again and don't come down until you are certain of having contacted the beacon.

I can think of a million things—aids to beacon flying that might be applicable but time is short and I am anxious to get this off.

Trust you will find these suggestions of some value and as one of the boys recently commented

"Yours for bigger and better blind spots",

Stork Busy on NAT East: News Letter Reveals

Council No. 12 Seems to Be Going in for Increases Recently

By CLARENCE W. HUDSON
Special Correspondent

August twenty-sixth proved to be a large day for Pilot (Buddy) and Mrs. Maurice Marrs, with the arrival of a beautiful baby girl. Coming so promptly, this announcement will hardly be a surprise to those members now working with "Buddy", but I am sure there are many others who are glad to hear of his good fortune.

* * *

Mr. and Mrs. Charles A. Thompson have announced the birth of a daughter on September eighteenth.

* * *

The other very latest newcomer is a beautiful daughter to Pilot and Mrs Emory Martin, on September twenty-fifth. Really, fellow-members, these three courageous young fathers command admiration, for they have struggled along extremely well, under the circumstances. So far, they have been successful in combating the impulse to talk glowingly of their "young hopefuls", but I feel that the time is near when they will begin to crack under the strain.

* * *

Vacation season is rapidly drawing to a close. Among the many who have been missing from the daily grind in recent weeks, are: Brandon, Kennedy, Marrs, McDonough, Gravis and Wolf. Brandon went touring through Canada, Kennedy visited the wilds of Massachusetts, Marrs flew to Oklahoma, while even now, Gravis and Wolf may be tramping through the Canadian forests, looking for a luckless, unoffending moose to put on the spot. McDonough, being young and single, presents too difficult a problem for your correspondent. If all this travel is representative the depression ought soon be over—or perhaps it **is** over.

* * *

Pilot Paul Reeder, on September seventh, had an unfortunate clash with weather conditions. Complete details are not available at this time, but I am happy to report, from reliable indirect information, that Paul is suffering only minor cuts and bruises about the head. He crashed on the side of a mountain ten miles west of Bellefonte, Pa. Ship and cargo were burned.

AN OPEN LETTER FROM THE WESTERN COAST

Friend Dave:

I first read your article in the August 15th AIR LINE PILOT, captioned "Airmail Cut Is Analyzed by Behncke", with a vague feeling of approval, passing on from it to the other items in the paper. But I have a feeling that there is something in the article that calls for more than passing interest from an air line pilot. In the first place it was a darned clever move against any thought that the operators may have on pilot wage reduction; a distinct warning to them that the pilots know that a reduction is unjustified and can prove that it is unjustified.

While reading it the second time my mind went back to a time not two years ago when there was talk of a pilots' wage reduction. I remembered the agitation among the pilots; their feeling of utter helplessness. At that time an operator could cut pilots' pay as he saw fit and could impose almost any kind of working conditions on them. There were just two things that a pilot could do in such cases: either take it and say he liked it, or drop out of flying and try to learn some other business.

I wonder if some of the boys remember those times? Do they remember how we used to gather in groups behind closed doors and in carefully lowered voices dicuss the urgent need for a strong pilot organization? Such an organization seemed like a dream too good to be possible in reality but if we could have one — it was treason, of course, to even talk about it—but if we could have one it would be worth a month's salary every year. You bet! Here's my money, and there's more where that came from. Sign this. Come on, sign this! Haven't you got guts enough to fight to keep your job worth something?

Maybe it would be worthwhile if we would reflect back on those times now and then. That article of yours recalled them to me and I was certainly startled at the contrast. We have the organization now; one that is stronger and better than we ever dreamed possible; one that has accomplished more than we ever thought possible. It is an organization that not only protects the pilots but is recognized by governmental officials and by the better operators as being a powerful factor in recent developments for the good of scheduled operation. With the assurance of its protection pilots can devote their whole time and attention to making themselves more and more valuable in their profession, without the fear that that profession might some day soon become impossible for any decent, self respecting man. If they do a first rate job of flying and co-operate with their Operator's policies, they no longer have to be afraid that some petty ground official may object to their choice in toothpaste or the pattern of their sox.

Really, it is startling when one looks back a couple of years or so. But sometimes I wonder if we do that enough? So far our organization hasn't cost us even one month's salary and yet some of those who yearned for it the most are now whining because they have to let the moths out of their pocketbooks while they dig up the small quarterly dues. And some of us just simply can't spare a couple of hours of our precious time once or twice a month to attend the council meetings that are absolutely vital to our organization. In fact, some of us have assumed a rather contemptable attitude of "give as little as possible in time and money to the Association but demand one hundred per cent for all you give and if possible get just a little bit more than that."

Well, I started out to compliment you on what I considered a very good and very timely article, and here I am getting wrathy because I hear some of the boys do a little crabbing now and then. I was even going to mention those jackals who are waiting for the Association to become absolutely invincible before they try to sneak in, but not being of that breed I am not able to understand their mental processes. However, I can understand those boys who jumped in at the first when the water was damned chilly. I haven't ever whimpered around because of the measly amount of money we've had to pay in but I've done a lot of tall kicking now and then. After this I think I'll look back at the past before I start kicking about the way the Association is doing things, and then maybe I'll also check up on whether I did my best in the first place to see that they did things in the way that I would have had them done.

This letter is just a sort of vote of confidence, I guess But maybe it would be worthwhile if you would suggest to the boys that every time they read a new issue of the AIR LINE PILOT they would do well to think back to those times when we had no Association and when even the reading of such a paper would be considered treason by some operators and a perfectly just reason for discharging the pilot who was caught with it in his possession.

Best regards from the West.

OFFER OF NAVIGATION COURSE

The following letter, received from Council No. 4, is published in THE AIR LINE PILOT not as a selling talk but for the information of those pilots sincerely interested in air navigation. The instructor mentioned herein is exceptionally well qualified to tutor line pilots in this course.

* * *

"To: All T & W A Pilots and Co-pilots.

"I suppose most of you already know I am supposed to be "bugs" on Celestial Navigation. However, I have a lot of fun out of "monkeying around with it and, also, looking to the future I hope to make good practical use of it.

"For quite a while I had a hard time finding some one to teach me. Some of the fellows who want to take a course still find that difficulty. I am not out arguing the merits for or against that type of navigating that you should or should not take a course in it, or why it will be worth while, etc. I am only trying to "line" up those who are interested enough to want to take a course.

"Mr. Pete Redpath, who is now navigator for the Hutchinson Flying Family flying from New York to Europe in a Sikorsky, said he would be glad to travel over our line and instruct any of you fellows who want to take a course. He said he could do it for $55 each including some of the tables, etc., that are necessary. That is not very much for him inasmuch as most of it will be individual instruction and it will take quite a few hours per person.

"I have already made arrangements with Mr. Frye so that he can travel over our line to the various places necessary to instruct those who are interested.

"As a navigator and an instructor I am glad to recommend him in a big way. He has had quite a few years at sea, was instructor at the Air Tech at San Diego. He and Gatty both taught Mr. and Mrs. Lindbergh very thoroughly in the art.

"Redpath expects to be back the last part of October. If you are interested, please drop me a note and let me know."

Yours very truly,
ROYAL LEONARD,
Chairman, ALPA Subcouncil
Glendale.

MORE ABOUT RADIO TALK

(Continued from Page 1.)

istics. Like most other men in business, these flyers are not concerned with work just during working hours. You might be surprised to know that they spend a good deal of their spare time working out problems in connection with flying and generally attempting to perfect themselves.

As an example, I dropped in one day recently on one of our pilots at his home. Outside, the sky was blue and the sun was shining, yet I found this particular flyer seated at his desk working out a radio range problem which would come in handy in case of poor visibility. He had drawn a number of diagrams and was busy making notations on a pad.

"Why the writing?" I asked him.

"Because," he replied, "you really understand a thing a lot better when you put it down in words."

I tried to get that flyer to accompany me over town but he insisted that he was too busy with his problem, so I left him still studying his diagrams and jotting down his conclusions. That's just one instance of the extent to which these fellows go in spending off-time hours working out their problems.

On another day recently I called up one of the flyers to see if he could play golf. He informed me that he was sorry, he couldn't make it — that he was all dated up to take some instrument flying practice. I insisted that he could do that some other day but he refused, saying it was important to get in the practice hours that particular afternoon. I therefore gave in and told him I would like to go down to the airport to look over the instrument flying plane. Some of you probably have seen this particular ship at Boeing Field. It looks like any other airplane except that it has a metal hood which fits over the rear cockpit. In instrument flying practice the practicing pilot sits in the enclosed cockpit and a check pilot sits in the open cockpit forward.

I met my pilot friend at the airport and asked to inspect the plane. Peering into the hooded cockpit I noticed a wide variety of instruments on the instrument panel. There were such things as turn and bank indicator, a tachometer, to show the number of revolutions of the propeller; an air speed indicator and compass; an oil pressure gauge, rate of climb indicator, and a temperature gauge. I remarked to the pilot that he certainly had enough instruments to use on his practice hops.

"Not so many, he replied. "These are just the bare essentials for instrument flying. You should see the instrument panel we are going to have on the new transport planes which the Boeing Airplane Co. is building for our lines. In addition to all those in this instrument flying ship, it is to have a duplicate turn and bank indicator, a directional gyro and sensitive type altimeter which will be adjustable to barometric changes as these are received by radio, a free air thermometer, a clock, a complete set of engine instruments, and a few other gauges."

He then went on to explain that the instrument flying plane is primarily for the purpose of making the pilot so familiar with the instrument panel that he will be able to fly entirely by it without being able to see outside the cockpit. I asked the pilot just how accurately he could fly the ship under such conditions. He replied that he could take off under the hood from Seattle, for instance, and locate a spot one hundred feet in diameter over Tacoma, or, for that matter, over Portland, The Dalles, Pasco, or any other point on the regular ariway.

He then proceeded to explain something about the directional radio range beacons which make such a performance possible. "At the south end of the Tacoma Field, for instance," he said, "there is a Department of Commerce radio range beacon. By means of two anetnna set at right angles to each other, four radio wave loops carrying the signals "A" and "N" are so synchronized that lines tangent to the loops form radio beams or pathways made up of the composite of these two signals. In other words, on these lines there is a steady dash signal, interrupted at intervals with the characteristic signal of the station."

I asked the pilot to go on and tell me just how he would find that particular radio range station after leaving Boeing Field. "I taxi to the lee end of the field," he replied, "and close the hood of the cockpit so that I am unable to see outside I then turn on the cockpit lights and wait for the check pilot to tell me, by means of the interphone system which we use, that all is clear on the field. On receiving that report I open the throttle and push forward on the control stick as I would in any ordinary take-off. Instead of watching outside objects for flight allignment, however, I keep my eye on the gyroscopically controlled turn needle to see that I don't deviate to the left or right. I must also watch the bank ball to see that my plane is correctly in line laterally. I must watch my air speed indicator and rate of climb indicator to see that I am maintaining the degree of climb which I desire. And I watch my compass to see that I keep to the desired course, since the turn indicator only shows the direction of the turn and not the amount of the turn."

I broke in on the pilot's naration here to remark that he seemed to have plenty of instruments to watch. "Yes," he replied. "But in doing so I become accustomed to reading them so that I react to them in the same way that one reacts to the sensations received when he is watching outside objects. As a matter of fact, instrument flying would be comparatively simple if the readings of instruments could be taken separately. Instead, they must all be read in co-ordination with each other and it is on that point that we must practice."

He then proceeded with his story of looking for the Tacoma radio range station. "I am in the air now," he said. "And I have so timed my take-off that I know I have enough altitude to clear all the obstructions before starting to turn. I have my radio head set on and as I turn I increase the radio volume until the signal of the radio range beacon is heard If I am to the left of my course I get an "A" signal and if I am to the right of my course I hear an "N" signal. When I receive a continuous dash signal I know I am on my course and I follow it to the beacon. As I proceed toward the Tacoma radio range station the volume of the beam increases. I keep the sound in my earphones down to a minimum so that I barely can hear it. As I approach the station the radio path on which I am riding becomes narrower and narrower until it seems that I am almost walking a tight rope. Just before getting over the station, if I am flying at 500 feet or more, I hear a distinct drop in the tone value of the beam, immediately followed by an abrupt increase at that point. From this. I know that I am directly over the station."

As the pilot finished this description I asked him if it were not true that pilots have definite sets of problems to solve in instrument flying practice. "Yes, we do,—problems which would be presented under actual conditions," he replied. "For instance, on reaching the Tacoma station I will fly over the beacon, locate the "cone of silence," as it is called, cut my gun and spiral down at a minimum glide angle, simulating a descent through a cloud layer.

"We also practice making accurate turns and recovering from unusual flying positions, such as stalls, slips and vertical turns. In doing these things, the check pilot in the forward cockpit takes the plane long enough to get it into any possible position. He then lets go of the controls and it is our job to bring it back to its normal flying position. At all other times the check pilot keeps his hands off the controls except in cases of emergency."

I asked my friend if the check pilot ever deliberately took a practicing pilot up and lost him in the air. "Yes," he answered. "They do that every now and then in practice. The check pilot will take the plane and throw it into several abrupt maneuvers to destroy our inherent sense of balance and direction. Then, with the instrument flying pilot keeping his eyes away from the turn and bank indicator and compass, the check pilot will fly to a point eight or ten miles away from a beacon station. During this time the radio is turned off and when the check pilot is satisfied that he has completely lost the practicing pilot he turns back the controls to him, permitting him to turn on the radio and ordering him to return to the cone of silence over the radio range station in the shortest possible time."

"Are you generally able to fulfill that order," I inquired.

"Yes," he replied. "We must do that. It is just a matter of finding it in the speediest time possible and in the most efficient manner."

That was that for the instrument flying lesson. The pilots, I find, take a keen interest in perfecting themselves in this work and in solving problems which they ordinarily would not be called upon to face. In spite of the fact that they are extremely accurate in using their instruments, they do not carry passengers when conditions are such that they cannot see out of their planes. It simply is a matter of practicing under the most abnormal conditions so that they will be better equipped to meet the normal conditions under which they regularly fly. Whenever visibility is so poor that objects cannot be seen passengers are not carried, the company feeling that it is wiser in all cases to send the pilot on alone or to delay trips rather than to take chances on getting through. Fortunately, there are few occasions when decisions of this sort are called for.

Something more about these pilots operating out of Seattle—all seven of them are married, and most of them have children. They go on their flights just as any other man goes to work and their wives have breakfast, lunch or dinner waiting for them when they return. Anyone meeting these men is impressed with their appearance of being physically fit. The company which employs them, as well as the Department of Commerce, is insistent on this point—that they are kept in the best possible condition. Every thirty days the flyers are called upon to pass the rigid Schneider test as a part of one of the most searching physical examinations in the world. Flight surgeons employed by the company constantly are checking their condition and seeing that they come up to requirements. All the flyers play golf, since that sport is regarded as one of the best possible means of keeping them fit.

CENTURY STRIKE BREAKERS:

The following were in flying status as of March 31, on Century Air Lines:

Merle F. Buck
T. R. Potts
H. S. Clark
M. A. Johnson
E. B. Smith
Joe James
E. M. Day, Jr.
C. H. Reeves
F. F. Sheltz
C. W. Childress
M. P. Knighton
Sam G. Grebe
Ennis L. Stewart
Earl A. Fields
Geo. E. Halsey
Ken Oliver
H. W. Lucas
Russel Mossman
Sidney Cleveland
Theo Graff
Ira Smalling
Wiley Moore
R. T. Roland
N. L. Sifers